EXHIBIT D

Direct message Antonio, Nasir Adaya and Warren Pfeffer - 2019-11-06 (UTC)

Private 11/6/2019, 11:53 PM
Nasir Adaya and Warren Pfeffer

- **Warren Pfeffer (UNESGE199)WP**

  I ran with Perlin,Handshake, and Algorand for about 4.5 hours today with embedded media persistence enabled and collected about 300MB worth of data (messages + media). The decision point now before we turn on hundreds of feeds 24x7 is where is best place to store the data from a cost perspective? At first I thought S3, but I don't know enough about your performance and access patterns for the data which will factor into the pricing of usage? It may turn out that EFS is a better way to store the data? Can you give me an idea of the following:

  1) Access frequency: how frequently do you believe you will be accessing individual files? [I assume if you are doing ML modeling you may need to access the files many time as you train your models?] Keep in mind that currently the messages are all flowing into a single file for all Telegram feeds (I use the term feed to mean channel or group). Since we don't want to grow this file forever I guess we should roll it on a daily basis at zero hour UTC? Also should it be all feeds in a single file or should it be a file per feed? As for the media, as outlined in my README.txt, that will be a file per media file arranged hierarchically by <feed>/<msg id>. Again, what will the access frequency be for those (I assume every time you read the parent message you will read the media file, or will the media files just be read once during an ETL process that will extract meta-data and sentiment from them)? These questions about access frequency will directly affect cost calculations because in AWS you pay per access as well as storage usage.

  2) Since EFS is like NFS, would this be an easier for developers to work with than S3? EFS costs more than S3 but it will be faster I/O and works with existing POSIX APIs in various languages. S3 will require a different programming model and also locks you in to AWS platform. One thought is that if your media is ETL only once but messages access frequency is high that messages could reside on EFS and media will only stay on EFS until ETLed and then media transferred to S3 for archival? One caveat about EFS is that I don't think it can span regions (at least not with out deploying a storage gateway service I think?), so the question is, will the ML processing be done in the same region as the feed collections?

  Can you guys think this over and get back to me ASAP on your thoughts on this? The sooner we pick the right platform for storage the sooner we can move towards production. I'm in the office on Friday instead of tomorrow this week so if you want to discuss tomorrow give me a time that works for a call, otherwise we can discuss on Friday. In the meantime, there is a bit more enrichment work I want to do on the data (such as adding time of message capture and perhaps other meta-data that may be useful for debugging) so I will finish up that coding whilst I wait for your feedback.
  11/6/2019, 11:53 PM

- **Nasir Adaya (UGGS65E13)NA**

  Yes, let me finish reading this and discuss with Antonio.
  11/6/2019, 11:54 PM
  And yes to rolling at 00:00 UTC
  11/6/2019, 11:54 PM
  1) I basically want to have text-based alerts based on pre-defined messages as well as real time sentiment analysis. I need to think a bit more on how we might parse/analyze the media in real time. I do think as a first take the text is most important (will figure out in a bit how we'd access the media and at what frequency).
  11/6/2019, 11:56 PM

- **Warren Pfeffer (UNESGE199)WP**

  I think we should do a whiteboard session on Friday
  11/6/2019, 11:56 PM

- **Nasir Adaya (UGGS65E13)NA**

  Let me think a bit more about the other points you mentioned. Will get back shortly.
  11/6/2019, 11:56 PM
  Yes let's do that. I will send an invite.
  11/6/2019, 11:57 PM

- **Warren Pfeffer (UNESGE199)WP**

  great
  11/6/2019, 11:57 PM

- **Nasir Adaya (UGGS65E13)NA**

  Sent invite.
  11/6/2019, 11:57 PM

- **Warren Pfeffer (UNESGE199)WP**

  thanks
  11/6/2019, 11:57 PM

- **Nasir Adaya (UGGS65E13)NA**

  Also including Raymond. Will be good for him to be there.
  11/6/2019, 11:57 PM

- **Warren Pfeffer (UNESGE199)WP**

  great